

Oregon.—21st, 26th, 27th, 28th.

Pennsylvania.—3d, 12th, 14th, 19th, 25th, 28th.

Rhode Island.—24th.

South Carolina.—11th, 16th, 17th, 21st, 25th.

Tennessee.—18th.

Texas.—19th, 21st, 24th to 27th.

Vermont.—24th.

Virginia.—4th, 19th, 25th, 26th, 28th.

Washington Territory.—20th, 22d, 25th, 27th, 28th.

Wisconsin.—23d, 27th.

Wyoming.—d, 20th, 22d, 27th.

The phases of the moon during February were: last quarter, 6th, 5.31 p. m.; new moon, 14th, 9.15 p. m.; first quarter, 22d, 5.25 a. m.; full moon, 28th, 10.54 p. m.; apogee, 9th, 7.24 p. m.; perigee, 25th, 6.24 p. m.

#### MIRAGE.

Fort Grant, Arizona: a mirage was observed at 10.30 a. m. of the 4th, showing the reflection of a lake fourteen miles west of station. On the 14th, at 9.30 a. m., a mirage was observed in the south, representing the forms of mountains inverted. Mirage was also seen on the 16th in the southeast, showing the reflection of a lake.

Mirage was observed at other stations as follows:

Webster, Dakota, 14th.

Vermilion, Dakota, 11th, 12th, 18th, 21st, 25th, 26th.

Salina, Kansas, 15th, 16th.

Northport, Michigan, 23d.

Marquette, Michigan, 24th.

Marquette, Nebraska, 26th.

Genoa, Nebraska, 26th, 27th.

#### MISCELLANEOUS PHENOMENA.

##### SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-three stations show 4,523 observations to have been made, of which three were reported doubtful; of the remainder, 4,520, there were 3,940, or 87.2 per cent., followed by the expected weather.

##### SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for February, 1885:

Date— Feb., 1885.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr's	Spots	Gr's	Spots	Gr's	Spots	Gr's	Spots	
2, 3 p. m.	0	0	0	0	0	0	5	25†	Most of the spots small. Do. Do.
5, 10 a. m.	0	0	0	0	0	0	5	70†	
6, 10 a. m.	0	0	0	0	0	0	5	60†	
7, 4 p. m.	2	10†	2	3†	0	0	5	60†	
10, 5 p. m.	2	15†					4	45†	
11, 10 a. m.	1	2	1	5†	1	2	5	45†	
13, 10 a. m.	0	0			0	0	5	45†	
15, 12 m.	1	25†	0	0	1	5	6	70†	
17, 1 p. m.	0	0	0	0	0	0	6	70†	
18, 5 p. m.	1	5	0	0	1	5	7	75†	
20, 1 p. m.	2	15†	0	10†	2	15†	9	75†	Most of the spots small.
21, 5 p. m.	1	5†	1	15†	0	0	9	60†	
23, 4 p. m.	1	2			1	2	5	35†	
24, 3 p. m.	1	1	1	2	1	1	5	30†	
25, 5 p. m.	1	1	0	0	1	1	5	20†	
28, 3 p. m.	2	55†					3	65†	

Facule were seen at the time of every observation. †Approximated.

#### EARTHQUAKES.

Professor C. G. Rockwood, jr., of Princeton, New Jersey, has forwarded the following report:

February 2, at 7.10 a. m., a light earthquake was felt at Wytheville, Wythe county, Virginia, with a sound like the rumbling of distant thunder, which seemed to come from the northwest. Apparently it was confined to the immediate vicinity of Wytheville. Inquiries by letter to adjoining counties brought replies from Marion, Smyth county, on the southwest; Rural Retreat, Wythe county, and Independence, Grayson county, on the south; Hillsville, Carroll county, on the southeast; Pulaski station, Pulaski county, on the northeast; and Bland Court House, Bland county, on the north, at none of which places was it felt.

The "Charleston News and Courier" of February 14th, 1885, contains the following:

CITY OF MEXICO, via GALVESTON, February 12th.—At Tequi Sixtlan (?) in the state of Oaxaca, a sharp earthquake was experienced last Sunday (8th). It lasted two seconds. Another more violent shock was felt at Niltpec, also in the state of Oaxaca, several buildings swaying and one house falling.

The following are extracts from "Nature" of February 19th and 26th:

Shocks of earthquake continue to be felt in the south of Spain. A telegram from Granada on the 12th, stated that slight shocks continued to be felt at Alhama, and on that day there was a shock at Terre del Campo, near Jaen. There were also shocks in the evening of the 14th, at Granada and Velez Malaga.

The last earthquakes in southern Spain (February 15th) were incident with slight subterranean motions in Algiers and in Savoy. The valley of Isère and Chamberg principally felt them.

#### METEORS.

San Diego, California, 4th: a meteor of great brilliancy, from which there was a continuous flow of sparks, was observed at 7.30 p. m. Its direction was from a point near the zenith northeastward through a path 20° in length.

Wickenburg, Arizona, 18th: a meteor was observed at 12.21 a. m.; it was apparently from six to seven inches in diameter and moved toward the northwestern horizon, the duration of its flight being from five to eight seconds. The light from the meteor was sufficiently bright to enable a person to read fine print by it. Just before its disappearance it exploded into two parts of about equal size, and for two or three minutes after the explosion a loud report was heard, resembling the sound of a distant cannon. During the passage of the meteor it threw off brilliant sparks and at its disappearance left a cloud which soon faded away.

Prescott, Arizona, 18th: a brilliant meteor passed across the sky from southeast to northwest at 12.15 a. m.

The following is from the "Washington Post" of February 24, 1885:

VICTORIA, B. C., February 23.—A meteor passed over this city this morning about 9 o'clock. It was of enormous size and appeared like a mass of molten iron. The noise caused by its passage was like that of escaping steam. Smoke and flames were thrown off by the meteor. It was seen to descend into the sea, a cloud of spray and steam marking the spot.

The following is from the "New York Maritime Register" of March 18, 1885:

The bark "Innerwick" (Br.) from Yokohama, at Victoria, B. C., March 2, reported that at midnight of February 24, in N. 37°, E. 70° 50' (probably W. 127°) the wind was blowing heavily from sse.; at 5 a. m. the sky changed to a fiery red, and all at once a large mass of fire appeared over the vessel and fell into the sea some fifty yards to leeward, with a hissing sound, causing the bark to quiver from stem to stern. A towering mass of white foam was then seen rapidly approaching the vessel. The bark was struck flat aback, and before there was time to touch a brace the sails filled again, and the roaring white sea could be seen passing away ahead. Another sheet of flame then ran down the mizzenmast, from the rigging of which poured myriads of sparks, and for twenty minutes the strange redness of the sky remained.

Lead Hill, Boone county, Arkansas: at 6.15 p. m., on the 27th, a bright meteor was observed.

Nashville, Tennessee, 27th: a very bright meteor was observed at 6.58 p. m.; it passed from a point 40° above the northern horizon in a southwesterly course and disappeared beneath the western horizon; it left a track of yellowish color which remained visible forty-five seconds.

Chattanooga, Tennessee, 27th: a brilliant meteor is reported to have passed over this place in a direction from east to west shortly before 7 p. m. on the 27th.

The following is an extract from the February, 1885, report of the Tennessee Weather Service:

Meteors were observed on the 19th at Quarter and on the 27th at Sunbright, Grief, Riddleton, Florence Station, Nashville, Ashwood, Kingston Springs, Hohenwald, McKenzie and Milan. The meteor of the 27th was one of the most brilliant and remarkable that has appeared in this part of the country for many years. Of this phenomenon the following notes were made: The observer at Sunbright reports, a large, very brilliant meteor appeared in the zenith at 7 p. m., traveling westward with a train of about 18° to 20° in length, and disappeared below the horizon. The body was yellowish in color. The observer at Grief reports a very bright meteor at 7 p. m., moving from east to west, seemingly as large as the moon. It disappeared

a little above the horizon in the west. The observer at Riddleton reports, at 6.50 p. m. a large meteor in sw.  $60^\circ$  from horizon, direction wnw., throwing off particles like a rocket before passing out of sight behind the horizon. The observer at Florence Station reports, at 6.54 p. m. a very large and exceedingly bright meteor observed se. to sw., starting se. altitude  $35^\circ$ , course se. to nw., disappearing due west of station; time of flight observed 3 minutes and 10 seconds. The observer at Ashwood reports, at 7 p. m. a very beautiful meteor in the north, lighting up the heavens brighter than the moon; it exploded with a loud report. A little girl who saw it ran in and exclaimed "the moon's busted!" The observer at Kingston Springs reports, a meteor was observed at 7 p. m. in ne.; seemed to be as large as a man's head, moving sw., after being visible ten seconds, it exploded, scattering fire in all directions. The observer at Hohenwald reports, at 6.30 p. m. a very brilliant meteor, first observed a little below the moon (which was about an hour and a half above the horizon), it passed directly overhead, moving west and disappeared about where the sun sets; about two minutes after it passed it exploded with a report like a cannon at a distance, followed by rumbling noises for about a minute. This meteor was very brilliant, as trees and buildings cast dark shadows, which traveled around them from west to east as it progressed westward. Although the full moon was shining brightly, the light attracted attention in the houses where lamps were burning, parties saying was similar to the light thrown in through the windows by a person passing with a lighted lantern. The observer at McKenzie reports, a meteor at 6.35 p. m., se., direction sw.,  $45^\circ$  above the horizon. The observer at Milan reports about 8 p. m., a large brilliant meteor about the size of an infant's head, appeared in the eastern sky  $30^\circ$  from the horizon, going in a southerly direction; when near the horizon it disappeared as if it had exploded; no noise was heard.

Meteors were also reported from the following stations:

Le Roy, New York, 1st, 14th.  
New River Inlet, North Carolina, 2d.  
Liberty Hill, Louisiana, 8th.  
Cedar Rapids, Iowa, 12th.  
Wausau, Wisconsin, 22d.  
Archer, Florida, 27th, at 1 a. m., very bright.  
Allison, Kansas, 27th, at 10.40 p. m., in the southern sky, passing northeastward.

#### WATER-SPOUTS.

The "New York Maritime Register" of March 11, 1885, contains the following:

Captain Simmons, of the British brig "Charley," at Point à Pitre, February 17th, reports that on the 6th, in latitude N.  $37^\circ 30'$ , and longitude W.  $72^\circ$  and  $71^\circ$ , passed near a water-spout, the water flying hundreds of feet into the air and going around at a fearful rate; the water-spout covered a space of five hundred or more square feet.

Sandy Hook, New Jersey: at 9.45 a. m. on the 10th a water-spout was observed in the direction of the Scotland light-ship, about four miles distant; it was clearly defined and lasted about one minute.

The s. s. "British Princess," F. H. Freeth, commanding, reports that on February 21st, in latitude N.  $39^\circ$ , longitude W.  $62^\circ$ , several well-defined, and many imperfectly formed water-spouts were observed between noon and 8 p. m., Greenwich mean time.

The British bark "Artizan," J. Dwyer, master, reports having observed on February 22d, two large water-spouts in latitude N.  $39^\circ 10'$ , longitude W.  $60^\circ 10'$ .

#### POLAR BANDS.

Montrose, Colorado, 16th.  
Archer, Florida, 4th, 7th, 10th, 23d.  
Anna, Illinois, 21st.  
Yates Centre, Kansas, 18th, 27th.  
Mountainville, New York, 1st.  
Memphis, Tennessee, 20th.  
El Paso, Texas, 4th, 19th, 28th.  
Rio Grande City, Texas, 4th, 5th, 6th, 24th, 26th.  
Wytheville, Virginia, 6th, 7th.  
Fort Bridger, Wyoming, 26th.

#### MIGRATION OF BIRDS.

*Geese flying southward.*—Cœur d'Alene, Idaho, 17th; Austin, Tennessee, 2d.

*Geese flying northward.*—Fort Smith, Arkansas, 27th; Sacramento, California, 14th, 25th; Red Bluff, California, 5th; Yates Centre, Kansas, 28th; Independence, Missouri, 28th; El Paso, Texas, 1st; Brownsville, Texas, 27th.

*Ducks flying southward.*—Memphis, Tennessee, 10th.

*Ducks flying northward.*—Indianola, Texas, 1st.

*Brants flying northward.*—Indianola, Texas, 26th.

#### DROUGHT.

Los Angeles, California, 28th: with the exception of a light sprinkle on the 23d, no rain fell at this place during the month, and much anxiety concerning the crops is felt by the farmers in this part of the state.

#### SAND STORM.

West Las Animas, Colorado: a violent sand storm prevailed from 6.45 to 7.30 p. m., the wind blowing at the rate of forty-five miles per hour from the north.

Wickenburg, Arizona, 12th, 28th.

#### PRAIRIE FIRES.

Dodge City, Kansas, 18th.

Fort Stockton, Texas: prairie fires were observed east of station on the 4th, and in the northeast on the 11th.

#### ERRATUM.

On page 15 of the January REVIEW, under "local storms and tornadoes," the tornado reported as having occurred at Haddock's Station, Georgia, at noon of the 12th, should read: midnight of the 11-12th.

#### NOTES AND EXTRACTS.

The following is an extract from the February, 1885, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr., Auburn:

The month of February has been decidedly colder than the same period of time in a number of years. The average temperature was about  $6^\circ$  below the normal. In north Alabama and in most of the middle portions of the State but little farm work has been accomplished because of the frozen condition of the ground on so many days of the month. The fall oats were all killed, and the farmers were compelled to replough the fields and sow them in spring grains. The wheat generally looks badly. In south Alabama the truck gardens suffered severely, the early cabbage crops being almost entirely destroyed. Two cold waves crossed the state on the 11th and 17th. During the passage of the first the temperature fell from  $50^\circ$  to  $65^\circ$  in twenty to thirty hours. This was the greatest reduction for the time recorded during the winter.

The average rainfall for the month was below the normal. There was a general snowfall on the 12th, and the depth of snow has been added to the amount of rain by considering ten inches of snow equal to one inch of rain. This is the rule adopted by the Chief Signal Officer. There were nine rainless days.

The average temperature for the winter just closed,  $44^\circ.4$ , is  $5^\circ$  below the normal. December 19th, January, 22d, and February 11th were the coldest days of the winter. The average precipitation, 17.99 inches, is about 5 inches above the normal.

Mean depth of rainfall, 3.58 inches; mean daily rainfall, 0.128; greatest depth of monthly rainfall, 6.25 inches at Newton; least depth of monthly rainfall, 2.23 inches at Brundidge; greatest daily rainfall, average for the state, 0.97 of an inch on the 24th; greatest local daily rainfall, 3.00 inches at Tuscaloosa on the 12th.

It is just twelve months since the organization of the State Weather Service. In reviewing the work accomplished the director compliments the observers upon the large amount of valuable data they have collected by earnest and careful investigation. In some respects the year has yielded to the watchful observers material that has been highly prized by students of meteorology in other sections. The bulletins of the service have been in demand, and many have been circulated outside of the state among the scientists of the country. It is to be regretted that so few of the stations were able to present a continuous record during the year; but at the end of another annual period the director trusts that the list of complete records will be very largely increased.

The railway signal service has become an established fact, and the amount of good that has accrued to the people of the state wherever the flags have been raised cannot be calculated. Expressions of indorsement and hearty approval have been sent to the director from all sections, and many stations where signals are not displayed have sent urgent requests to have the same favors extended to them.

#### State summary.

Mean temperature,  $42^\circ.6$ ; highest temperature,  $80^\circ$  at Mount Willing on the 9th; lowest temperature,  $1^\circ$  at Gadsden on the 11th; range of temperature,  $79^\circ$ ; greatest monthly range of temperature,  $69^\circ$  at Gadsden; least monthly range of temperature,  $49^\circ$  at Mobile; mean daily range,  $13^\circ$ ; greatest daily range of temperature,  $49^\circ$  at Tuscaloosa on the 9th; least daily range of temperature,  $0^\circ$  at Clintonville on the 13th and Fayette on the 8th.

Days of general rainfall, 8th, 9th, 15th, 24th; average number of days on which rain fell, 8; average number of cloudy days, 10; average number of